Comprehensive Request for Additional Information

June 17, 2016

Excelsior Mining Arizona, Inc.
Attn: Roland Goodgame, Executive VP
2999 N. 44th Street, Suite 300
Phoenix, Arizona 85018

Re: Gunnison Copper Project
Individual Aquifer Protection Permit
Inventory No. 511633, LTF No. 61397

Dear Mr. Goodgame:

The Arizona Department of Environmental Quality received the above-referenced application on January 13, 2016. You submitted this document in accordance with Arizona Administrative Code (A.A.C.) R18-9-A201. At this time, you are in the Substantive Phase of the Licensing Timeframe (LTF) for this application.

Required Information

The following information is required to lift the suspension of the timeframe and continue the processing of this application as per Arizona Revised Statues (A.R.S.) § 41-1075:

1. The application indicates that the bedrock is both fracture dominated and also equivalent porous media (EPM). Excelsior further states that EPM is appropriate for large scale evaluations such as for the groundwater flow model. Excelsior further clarifies that EPM is not appropriate at a scale associated with individual wells and short-term, five day, aquifer tests, and instead the aquifer is fracture dominated. ADEQ agrees with this general characterization. However, you must provide the following information and evaluation, including but not limited to, whether fracture orientation was evaluated based upon oriented core and televiewer-type logs, the data and analysis of fracture density that was evaluated for the geologic model and how the faults and fractures were determined to be either conduits or barriers to groundwater flow per Arizona Administrative Code (A.A.C.) R18-9-A202(A)(5)(b) and A.A.C. R18-9-A202(A)(8)(b)(iii).

2. The application must discuss how the effectiveness of the injection/recovery wells are to be measured, the adequacy of the planned monitoring well network, outside of the

proposed POC wells and if no additional monitoring is proposed why that is adequate per A.A.C. R18-9-A202(A)(5)(b) and A.A.C. R18-9-A202(A)(6).

3. <u>Section 5.4, Groundwater Quality</u>
   In the course of monitoring, Excelsior detected petroleum odors in these and other coreholes, and free product in CS-10 and CS-14. Samples were collected as part of a study of Light Non-Aqueous Phase Liquids (LNAPLs) in groundwater by Haley & Aldrich (2015).

   a. Please provide additional information regarding the lateral and vertical extent of the petroleum plume in the groundwater per A.A.C. R18-9-A202(A)(8)(b)(vi and vii).

   b. Please provide additional information regarding your plan in addressing and determining the source of the petroleum contamination in the groundwater per A.A.C. R18-9-A202(A)(8)(b)(vi and vii).

   c. Please provide additional information regarding the impact of mixing and injecting petroleum contaminated water to the aquifer per A.A.C. R18-9-A202(A)(8)(b)(vi and vii).

4. <u>Section 5.4 (Groundwater Quality)</u>
   Several PAHs were detected in the LNAPL samples from coreholes CS-10 and CS-14 where free product had been recovered.

   Per A.A.C. R18-9-A202(A)(8)(b)(vi and vii), please provide information regarding the source of the PAHs in the groundwater. Also, please provide information regarding the lateral and vertical extent of the PAHs plume.

5. <u>Section 5.10 (Compliance With AWQS)</u>
   After each block is depleted of copper, Excelsior will rinse the block with groundwater from a nearby source until groundwater within the block meets AWQSs. Geochemical modeling (Appendix J.l) has shown that a rinse-rest-rinse approach will result in groundwater quality that meets AWQSs.

   Per A.A.C. R18-9-A202(A)(6)(a and b) and A.A.C. R18-9-A202(A)(8)(b)(vi and vii):

   a. Please provide specific information in describing your term above "a nearby source" especially as petroleum contamination is known to be present in the groundwater within the project.

   b. Please clarify if the geochemical modeling considered the contaminated water in concluding that rinse-rest-rinse approach will result in groundwater quality that meets AWQSs.

c. Please clarify how the geochemical modeling is accurate without knowledge of the lateral/vertical extent and volume of the contamination in the groundwater within the project.

6. Section 5.4.5 (Groundwater Quality in the Vicinity of the Project)
Several AWQSs were exceeded for each JCM POC well, and the sulfate concentrations were elevated to above gypsum solubility, suggesting the water quality of the JCM POC wells is not representative of the regional groundwater quality. Therefore the JCM POC well water quality data were not included in this APP application.

Per A.A.C. R18-9-A202(A)(6)(a and b) and A.A.C. R18-9-A202(A)(8)(b)(vi and vii):

a. Please clarify and discuss the impact of mixing and injecting petroleum contaminated water within the project site and circulating this water to the JCM site.

b. If the petroleum contaminated water from the project site is utilized in the mining process at the JCM site, please provide supporting data and information that the JCM POC well water quality data are not required to monitor the water quality at the JCM POC.

7. Section 5.101.3 (Pollutant Management Area)
The PMA is defined in AAC R18-9-A302(2)(a) as "the horizontal plane of the area on which pollutants are or will be placed." A single PMA, approximately 405 acres in size, circumscribes the ISR wellfield and the process solution and non-stormwater ponds (Figure 5-16).

Per A.R.S. §49-244:

a. Please clarify why the south and southeastern PMA boundaries are not coinciding with the south and eastern boundaries of the southwest Evaporation Pond.

b. Please clarify why there is a sharp angle PMA boundary shape southeast of the Raffinate pond.

8. Section 5.8 (Groundwater Flow Model)
Groundwater flow and particle-track modeling (Appendix I) has shown that migration of mining solutions outside the wellfield can be prevented using this approach.

Per A.A.C. R18-9-A202(A)(5)(b):

a. Please clarify how the groundwater flow and particle-track modeling has accounted for all the injection and recovery wells in all 3 phases of the project without having accurate design and layout of these injection and recovery wells.

9. Section 5.9 (Process Description and Layout Discharge Impact Area)
The (DIA) indicated by the MODPATH output is shown on Figures 63 and 64 in Appendix I. It is based on the distance traveled by the particles during the 23-year simulation.

    a. Please revise Figure 64 to show the PMA boundaries in addition to the existing DIA boundaries per A.A.C. R18-9-A202(A)(8)(b)(xii).

10. Section 1.2.4
Aquifer testing will be performed at installation, and used to determine layout, pumping or injection rates, and number of injection or recovery wells in a given area.

    Per A.A.C. R18-9-A202(A)(8)(b)(iii):

    a. Please clarify the statement above, what is meant by installation, and how these installations are determined.

11. As discussed in Section 1.2.1, production is anticipated to increase in stages.

    Please clarify how the groundwater removal rates increase from one stage to another (both hydraulic control and recovery wells), how would it impact the aquifer per A.A.C. R18-9-A202(A)(8)(b)(iii and iv).

12. Section 1.2.5 (Process Flows)
Clean water that is needed in excess of the groundwater supplied by the hydraulic control wells will be supplied by water supply wells, the location(s) of which are to be determined.

    Please identify the source and quality of the clean water that is needed in excess of the groundwater recovered from the injection/recovery well networks per A.A.C. R18-9-A202(A)(8)(b)(iv).

13. Section 1.2.5 (Process Flows)
Sources of water to the Clean Water Pond will include hydraulic control water (Stream 11) and groundwater from water supply wells (Stream 12). In Stages 2 and 3, clean water will be augmented by treated water from the WTP (Stream 18). Clean water will be injected (Stream 13) into the formation and recovered (Stream 14) to reduce concentrations of regulated constituents.

Per A.A.C. R18-9-A202(A)(4):

a. Please clarify the statement above in terms of providing specific information regarding the various chemicals and the utilized procedure in mixing the different waters including treated water from the WTP.

b. Also, please clarify the plan or process that will be utilized in order to ensure that the concentrations of regulated constituents will be reduced.

c. Please provide the calculations utilized for mixing the different types of water.

14. <u>Section 1.2.5 (Process Flows)</u>
The groundwater produced from hydraulic control pumping will be conveyed to the Clean Water Pond.

Per A.A.C. R18-9-A202(A)(8)(b)(iv and vi):

a. Please identify the locations of the hydraulic control wells that will be providing clean water to the Clean Water Pond.

b. Please provide the quality of the groundwater that will be pumped from the hydraulic control wells.

15. The WTP will be designed to produce high density solids during the neutralization of treated water. Addition of lime raises the pH causing the precipitation of metal hydroxides and sulfate minerals. The solids will settle in a clarifier to maximize water recovery and solids density. Clarifier underflow, consisting of precipitates, will be routed to a Solids Impoundment (Stream 20).

Please provide additional information on the process that will be used in handling the Clarifier underflow, consisting of precipitates per A.A.C. R18-9-A202(A)(5).

<u>Volume I</u>

16. A.R.S. 49-243(B)(1) indicates the facility should be "designed, constructed and operated as to ensure the greatest degree of discharge reduction achievable through application of the best available demonstrated control technology (BADCT), technology, processes, operating methods or other alternatives, including, where practicable, a technology permitting no discharge of pollutants."

Per A.A.C. R18-9-A202(A)(5)(a)(i) and (b), please provide an alternative BADCT analysis using the process specified in the Arizona Mining BADCT Guidance Manual (BADCT Manual) in Section 1.1.3, Individual BADCT Review Process For New Facilities. As one of the alternatives, evaluate the BADCT discharge control for in-situ leach with deep well injection as per Section 3.4.5.3.1 of the BADCT Manual which indicates that the recovery wells should be pumped at a greater rate than the injection rate. Please note that the volume of fluids recovered should not include the volume of fluids pumped from the hydraulic control wells (i.e. the cone of depression is maintained at the perimeter of the 5-spot groups within the ore body). Note that the BADCT Manual makes no mention of the use of peripheral hydraulic control wells to achieve the recovery rate and establish the cone of depression to contain, capture and recycle solutions. The alternative BADCT analysis must include an evaluation of the discharge reduction achieved for each alternative with the goal of minimizing discharge to the greatest degree practicable as required by A.R.S. 49-243.B.1.

17. A.A.C. R18-9-A202(A)(5)(a) – Section 7.1.4.2.2 indicates that injection rates will depend on several factors including the rate at which recovery wells can be pumped. Also, this section indicates "Compliance with a specific net volume or net rate of extraction in excess of injection is not proposed as a permit condition". ADEQ disagrees, and believes that the permit should include alert levels and requirements to assure the extraction rate exceeds the injection rate so that hydraulic control and the cone of depression barrier are maintained.

    Provide permit conditions and alert levels to demonstrate maintenance of the cone of depression including the following:

    a. What are the criteria for selecting pumping or injection rates, and number of injection or recovery wells in a given area?

    b. Proposed alert levels for injection and recovery rates.

    c. Proposed net differential (e.g. percentage difference) that achieves greater extraction than injection.

    d. Maximum injection pressure.

    e. An alert level for the inward hydraulic gradient. The alert level should be a differential between the water level observed in the intermediate monitoring wells (higher) as compared to the recovery wells (lower).

    f. Propose monitoring of the cone of depression and how it will be verified through direct measurement at the PMA boundary.

18. The application does not include a map clearly identifying the location of the various wells at each stage of the project. Also, Section 7.1.4.2.1 indicates the strategy for controlling solutions is to install hydraulic control wells that will generate overlapping cones of depression around the perimeter of the wellfield. Assumptions in the model include "over

the duration of the Project, the total rate of pumping from the ISR wells and hydraulic control wells will be adjusted and maintained to exceed the total rate of lixiviant injection".

This section also states that the location of hydraulic control wells are approximate and the locations will be determined by site-specific conditions and the progression of in-situ mining activities. Also, Section 9.4.2.1 indicates hydraulic control will be monitored by measuring fluid levels in observation well pairs installed in bed rock. ADEQ cannot issue a permit based on a conceptual plan of maintaining hydraulic control.

Per A.A.C. R18-9-A202(A)(1), (2), and (4), please, provide a site plan and a topographic map showing boundaries for each stage (Stages 1, 2, and 3) of the project. Indicate the location of the injection, recovery, intermediate monitoring, observation, hydraulic control, and point of compliance (POC) wells, and the pollutant management area (PMA) for each stage of the 5-spot well pattern on the requested map. The anticipated location and numbers of wells that will be installed during Stage 1 will be required, since a number of factors including but not limited to the PMA and DIA boundaries, and closure costs associated with Stage 1 are dependent on this information. Please note that the as-built location of the injection, recovery, intermediate monitoring, observation, and hydraulic control wells will be required prior to initiation of injection as an amendment to the permit.

a. The applicant must provide approximate center position locations for each injection/recovery well cluster per A.A.C. R18-9-A202(A)(2).

b. Provide the rationale for the location of the PMA in relation to the wells, to demonstrate that the PMA is drawn at the limit of the area where pollutants will be placed, including the barrier designed to contain pollutants in the facility pursuant to A.R.S. 49-244.1. Please note that the PMA should be drawn at a location where the cone of depression will be monitored as a permit condition and hydraulic control must be demonstrated on a continuous basis.

19. Per A.A.C. R18-9-A202(A)(4)(a), please indicate the pH and composition (concentration of acid) of the lixiviant.

20. A.A.C. R18-9-A202(A)(5)(a) – During Stage I, process solutions will be stored and managed at the Johnson Camp Mine (JCM) facility. Please provide a water balance that includes the volume of fluids that will be sent to the JCM facility from the project site to demonstrate that the ponds at JCM are adequately sized. Please provide a contingency plan to manage solutions at the Project Site, in the event the ponds at the JCM facility are unable to store additional fluids, or should the pipeline to JCM become inoperative. An estimate of volumes maintained in the pipeline to JCM should be provided.

21. A.A.C. R18-9-A202(A)(5)(a) – Process flows were presented in Section 1.2.5 for the three stages of operation. The process flows indicate that mechanical means of evaporation will be utilized to enhance evaporation in the Evaporation Pond. The use of mechanical

evaporators is also discussed in Section 5 of Appendix K and Appendix M (for Stage 1). Please provide design of the proposed mechanical evaporation system (for all Stages of the project) and provide a discussion of the potential for overspray beyond the footprint of the pond.

22. A.A.C. R18-9-A202(A)(2) – In Figure 2-1, is the parcel of land titled "Benson 1550 LLC" property part of the Gunnison Copper Project or excluded from it?

23. A.A.C. R18-9-A202(A)(5)(a) – Section 3.4, Site Specific Geology, indicates there are 217 drill hole data points in the region, including 122 drill holes immediately in the resource area, and 95 drill holes within the project area. As per Section "3.4.5.3.1 Discharge Control - In-Situ Leaching With Deep Well Injection" of the BADCT manual, "Boreholes or wells, which may act as conduits for leachate to contaminate aquifers, should be plugged and abandoned in accordance with Arizona Department of Water Resources rule R12-15-816 and required UIC regulations (40 CFR Part 146)". Please indicate the schedule and procedure to abandon the drill holes and any other boreholes and wells located within the project area or the immediate vicinity of the ISLR operations.

    This section also indicates there are several faults within the project area. Please provide an evaluation of the potential for activating a fault based on the proposed in-situ and recovery operations.

24. A.A.C. R18-9-A202(A)(4) & (5)(a) – Section 3.7 indicates "no earthquakes with magnitudes greater than 5.0 occurred in southeastern Arizona between at least 1850 and 2000". Information obtained from the Arizona Geological Survey website, indicates the Great Sonoran Earthquake of 1887, which was estimated at 7.4 on the Richter scale was centered approximately 40 miles south of Douglas, Arizona. Recently there have been several earthquakes in the southeastern Arizona region, one 10-miles south of Duncan, Arizona in June of 2014 which was 5.3 on the Richter scale.

    Please provide an engineering evaluation that demonstrates the integrity of the facility will not be jeopardized in the event of the Design Earthquake (DE) (BADCT Manual Appendix E). The DE should be evaluated considering known active faults (regionally-occurring) within a distance of 200 km (≈ 125 miles). Figure 3-1 in Volume 1, depicts the Gunnison Hills fault approximately one mile east of the proposed wellfield and impoundments.

25. A.A.C. R18-9-A202(A)(4) and (5)(a) – Section 5.4 indicates that the groundwater beneath the project facility is impacted by volatile organic compounds and other petroleum hydrocarbons, and Section 6.2.7 indicates that the total concentration of organic compounds in the process solutions is expected to be approximately 30 to 50 mg/L total petroleum hydrocarbons (TPH). Please provide an evaluation of hydrocarbon impacts on the following:

a. Impoundment HDPE-liners at the Johnson Camp Mine (JCM) during Stage 1, and proposed Gunnison project Stages 2 and 3.

b. Equipment failure and maintenance problems for all mechanical equipment that will be associated with the permitted discharging facilities (well field and process/storage impoundments).

c. Chemical changes due to interaction between hydrocarbons known to be present at the site and process solutions (pregnant leach solution (PLS), raffinate, make-up water, and etc.).

d. Compatibility with materials and structures associated with the well field operations (well/wellhead construction, pipelines, etc.).

26. A.A.C. R18-9-A202(A)(5)(a) – Please depict the ore body and the injection and recovery zones on figures showing geologic cross-sections such as Figures 3-5, 3-6, and 3-7 in Volume 1.

27. A.A.C. R18-9-A202(A)(5)(a) – ADEQ understands that the aquifer at the site is unconfined and is located within both the basin fill and the formations targeted for in-situ leaching of oxide ore. Section 7.1.4.1.2 indicates that due to low hydraulic conductivity, the sulfide zone provides a site specific control on vertical migration of injected solutions. Due to the presence of sulfide zone beneath the injection zone (i.e. the oxide zone), the vertical migration potential appears to be limited in the downward direction. Please provide a map showing a plan view of the extent of the basin fill aquifer, and provide a discussion on the potential for upward migration into the basin fill portion of the aquifer.

28. A.A.C. R18-9-A202(A)(5)(a) - Section 9.4.1 indicates "The proposed permit condition is that the 30-day rolling average of total volume of injected fluids will not exceed the 30-day rolling average of total volume of recovered fluids (production plus hydraulic control pumping)". Provide the rationale that maintaining a 30-day rolling average of injected vs recovered volumes is an effective means of demonstrating that hydraulic control and the cone of depression is maintained at all times.

29. A.A.C. R18-9-A202(A)(5)(a) – Section 7.1.4.2.2 states "An inward hydraulic gradient will be maintained around the active portions of the ISR wellfield, as measured in observation wells located near the hydraulic control wells". Also, Section 10.2.2 indicates "Loss of hydraulic control may occur if fluid levels in the observation wells do not show an inward hydraulic gradient towards the wellfield".

    Please note that an inward hydraulic gradient towards the recovery wells shall be established and confirmed prior to the injection of acidified process solution into the injection wells and maintained at all times. Please provide a description of the automatic controls and alarms that will be used in the well field to ensure process upsets do not result in the loss of hydraulic control.

Please include a description of the mechanical controls and monitoring devices for the well field injection system(s). An explanation of the process, corrective action, and how these devices will regulate injection and recovery fluid flow should also be provided. The controls and monitoring devices should include:

<u>Injection Well System</u>:

a. Pressure gauge.

b. Flow meter at the injection manifold for measuring flow rates in gallons per minute (gpm).

c. Totalizing flow meter for measuring cumulative flow (gallons) into the injection manifold.

d. Flow switch at each injection well for indicating flow.

e. Valve(s) at each injection well for controlling flow.

<u>Recovery and Hydraulic Control Wells</u>:

a. Continuous reading flow meter (gpm) at the recovery manifold.

b. Totalizing flow meter (gallons) at the recovery manifold.

c. Isolation valve(s) at each recovery well.

d. Flow switch at each recovery well.

e. Pressure transducer within all or selected recovery wells. Transducers were not noted on the well diagrams provided in Section 7.1.4.4 (Volume I) Figures 7-2 through 7-4.

30. A.A.C. R18-9-A202(A)(5)(a) – Figures 7-2, 7-3, and 7-4 in Section 7, show the use of clean fill as backfill for the well annulus through the Basin Fill (upper well portion), along with a statement in Section 7.1.4.4.4 (Volume I) that "The casing annulus of all Class III wells will be grouted to 100 feet above the basin fill/bedrock contact.", etc. Please indicate if the injection wells meet the EPA Class III Underground Injection Control (UIC) requirements and if the well annulus is permitted to be filled with materials other than grout. Please explain why the annulus of the recovery wells

contain clean fill as opposed to grout. Also, provide rationale for the uncased portion of the borehole where injection and recovery take place.

31. A.A.C. R18-9-A202(A)(5)(a) - Section 9.5.1 states "The well will be considered to have passed if there is less than a 5% change in pressure during the 30 minute period". Please confirm that it is the 5% decrease in pressure as opposed to change in pressure.

32. A.A.C. R18-9-A202(A)(5) - Provide an analysis of the potential for subsidence within the project site for the life of the facility. As discussed in the BADCT Manual Section 3.4.4.3.2, In-Situ leaching may result in subsidence through the dissolution of underlying rock.

Volume III - Appendix K - Impoundment BADCT

The following deficiencies apply to all Stage II impoundments. These include: Raffinate Pond, PLS Pond, Recycled Water Pond, Evaporation Pond, Solids Impoundment, and Plant Runoff Pond.

33. A.A.C. R18-9-A202(A)(5)(a) - Appendix K, Section 2.2 indicates entrained organic phase in the Raffinate Pond has lighter density and will float in a thin layer on the surface of the pond, having very limited contact with the pond liner. Please explain what quantity of organics are expected to be found in the dissolved phase. Also please explain why floating organics are not expected to cause liner/seam damage for all lined ponds.

34. A.A.C. R18-9-A202(A)(5)(a) - Please provide the leakage collection and recovery system (LCRS) sump design, dimensions, and volume for each pond.

35. A.A.C. R18-9-A202(A)(5)(a) - For each impoundment, please provide a topographic map including sufficient detail, showing run-on and run-off storm water drainage for area surrounding each pond using a scale that is large enough to depict contours in the vicinity of the ponds. Please use arrows on the map to show surface water flow direction(s).

36. A.A.C. R18-9-A202(A)(5)(a) - Please provide the design for erosion control (rip-rap or diversion ditches, etc.) to protect the elevated portions of perimeter embankments. Please indicate the approximate height of the embankment in relation to the surrounding ground level for the cross-section view of all the ponds presented in Appendix K, Figures K-2 through K-8. In some cross-sections, there appears to be no embankment provided, please explain. Indicate arrows on the drawings to show where the surface flows are anticipated to enter the pond.

    In case of the Plant Runoff Pond, Section 7.5, Volume I, indicates that surface flows will be directed into the western end of the pond. Please indicate if the Plant Runoff

Pond is designed to accept surface flow along the entire western edge. Indicate arrows on Drawing No. 350-CI-008 to show where the surface flows are anticipated to enter the pond. Also, Section R of the same drawing shows a relatively small embankment along the western edge. Please indicate the height of the embankment on the drawing.

37. A.A.C. R18-9-A202(A)(5)(a) - For each impoundment, please provide manufacturer's specifications for the liner material, which should also include the acceptable chemical compatibility with the liner system materials and liquids to be contained, including the pH of the extracted fluids from the well field and volatile organic compounds known to be present in the groundwater.

38. A.A.C. R18-9-A202(A)(5)(a) - For each impoundment, please provide a basis and calculations that determined the volumes presented in Tables 2.1, 3.1, 4.1, 5.1, 6.1, and 7.1 in Appendix K of Volume III. Include water balance calculations to account for all inflows and outflows including the 100-year, 24-hour storm. Please explain why the ponds are designed for only 8-hour process volumes and provide a justification. For the Plant Runoff Pond, provide the estimated volume of accidental discharge from other process solution ponds and include this volume in the water balance.

39. A.A.C. R18-9-A202(A)(5)(a) - Please provide the locations of all borings (abandoned wells, boreholes, etc.) located within the footprint and within 150-feet of the perimeter of each pond. All borings must be properly plugged in order to prevent the potential migration of impoundment fluids due to liner failure.

40. A.A.C. R18-9-A202(A)(5)(a) - Please provide a Quality Assurance/Quality Control (QA/QC) Plan including all BADCT elements.

41. A.A.C. R18-9-A202(A)(5)(a) - According to Appendix K, Section 7.7, of Volume III, the Plant Runoff Pond will be used to receive overflow from the Raffinate Pond. BADCT Manual Section 2.2.3 recommends that "if a Non-Storm Water Pond is used for overflow protection, the contingency plan must include procedures to either neutralize leachate/solution prior to discharge or pump-back overflow so residence time in the Non-Storm Water Pond can be limited." ADEQ was unable to locate this specific requirement within the Contingency Plan located in Section 10 of Volume I of the above referenced document. Please clarify.

Volume I - Section 7.1.5 Wellfield Closure Strategy [A.A.C. R18-9-A202(A)(10)]:

42. This section does not indicate when the Stage 1 wells will be abandoned; i.e. whether they are abandoned as the rinsing for a given 5-spot is completed demonstrating that concentrations of all constituents are at or below acceptance criteria (as stated in Appendix M), or at the end of Stage 1. Provide a detailed closure strategy including the schedule of abandoning the wells as mining activities progress.

43. According to Volume 1, Section 7.1.5.1, page 12, a sample size of "approximately 10% of the wells within the mining block" will be monitored to determine the effectiveness of groundwater rinsing. Please provide the rationale, including references, for selection of this sample size. ADEQ believes that this is too low and that all wells within the PMA should be monitored to determine the effectiveness of rinsing.

44. Please add to the laboratory analyses list (Section 7.1.5.1, page 12, paragraph 3, Volume I) volatile organic compounds (VOCs), due to site contamination.

Volume III - Appendix M - Wellfield Closure Costs [A.A.C. R18-9-A201(B)(5)]:

The closure costs provided in the application lack sufficient details. The closure and post-closure costs should contain information including, but not limited to the following: unit costs (not lump sum), unit rates, materials quantities, labor costs, mobilization/demobilization costs, equipment costs, sampling and analytical costs, etc. Use third party costs for activities to be performed by a 3rd party contractor. Include contingency costs for the overall closure and post-closure costs including justification. The contingency costs should take into account the potential for additional rinsing (if required) beyond the time frame predicted by the geochemical model results presented in Appendix J. ADEQ recommends the use of Nevada's 'Standardized Reclamation Cost Estimator' (SRCE) for determining mine closure costs.

45. ADEQ understands that in-situ leaching will occur in the oxide ore body which contacts the basin fill at varying elevations at the project site. The aquifer is within the basin fill where the contact between the basin fill and the oxide is below the water table. There may be a potential upward migration of injected fluids into the basin fill (refer to Comment No. 10). Please include the closure costs for rinsing in the basin fill portions of aquifer which could contain injected fluids.

46. Under the header titled "Fixed Closure Costs", the following statement was included:

    "The maximum number of wells in operation in any year is 63 recovery wells and 42 injection wells..."

    Does the above statement indicate that in the final year of Stage 1, there will be 42 injection wells and 63 recovery wells that will require closure? See Comment No. 35 below for additional questions regarding the number of wells planned for Stage 1.

47. Under the header titled "Variable Closure Costs", the following statement was included:

    "Some of the wellfield closure costs are dependent on the number of wells that need to be rinsed and closed at any given point in time."

a. Information relating to the number of wells included in evaluating the closure costs for Stage 1 was not evident in the application. Please provide an evaluation of closure costs based on the number of wells (injection, recovery, observation and hydraulic control wells) planned for closure in Stage 1.

Another statement under the same header, included:

"Water supply costs are based on the existing wells at the Johnson Camp Mine...".

a. Please provide information relating to the quantity of water available and quality of water proposed to be supplied by the wells at the JCM facility. Please note that if additional treatment would be required prior to use of the JCM water for rinsing, these costs should be detailed in the proposed closure costs.

b. Please provide the cost (power and any other associated costs) to inject the rinsate.

c. Please explain why verification sampling (Table M-7) will be conducted on only 10% of the recovery wells (see Comment No. 30).

d. In Table M-7, please explain what the number "Recovery Wells Installed" represent for each year; i.e. does this mean that in each year up to Year 10, 480 recovery wells will be installed?

e. In Table M-8, please provide the basis of the footage of the wells drilled in each year; i.e. number of injection wells, recovery wells, their depths, etc.

f. Please indicate at what stage the hydraulic control wells and the observation wells will be abandoned. If any are abandoned during Stage 1, please provide the number, type of wells, and the associated cost of abandonment.

g. Please include costs to pump all the hydraulic control wells necessary to maintain hydraulic control until final closure.

48. Please provide costs associated with wellfield and well abandonment including but not limited to the following:

- ADWR fees
- Removal of electrical, wellhead assemblies, and control boxes
- Well pump removal
- Concrete structure removal (pads, monuments, etc.)
- Equipment costs
- Waste material disposal
- Mobilization/Demobilization
- Site reclamation (restoration)

49. Please provide detailed breakdown and explanation of how the credits are calculated and applied in the various cost estimation tables (M-7, M-8, and M-9) provided in the application.

50. No post-closure costs have been provided. Please provide post-closure costs for monitoring and maintenance following the rinse period and the rationale for the duration of post-closure. Please provide a table which clearly shows the closure and post-closure costs by line items.

Volume III - Appendix O – Alert Level Calculations for LCRS

51. A.A.C. R18-9-A202(A)(5)(a) - The application only includes Alert Level 1 volume for the LCRS system. Please provide calculations for the Alert Level 1 (AL1) and Alert Level 2 (AL2) for all the double-lined ponds. Also, Section 3.2 Results has two tables containing "Depth" and "Max Depth". Please explain what these depths represent. The "Max Depth" used in the calculations to determine the "Proposed AL" does not appear to match the depth presented in the drawings in Appendix K. For example, the drawing for the Raffinate Pond indicates the maximum depth at the shallow end is approximately 19 feet and the maximum depth at the deep end is 23 feet. Please explain why 7 feet used in calculating the AL.

52. Presence of hydrocarbons in the groundwater has been documented in the application. Arizona Revised Statutes (A.R.S.) 49-243(B)(3) states that "no pollutants discharged will further degrade at the applicable point of compliance the quality of any aquifer that at time of issuance of the permit violates the aquifer quality standard for that pollutant." Please provide an evaluation that capture and reinjection of hydrocarbon pollutants through the In-Situ process in other parts of the aquifer does not violate requirements of other programs such as the leaking underground storage tank (LUST) program or other applicable ADEQ programs.

53. Submit revised closure and post-closure cost estimates which comply with the requirements of A.A.C. R18-9-A201(B)(5), based on the respective comments presented in the hydrology and engineering sections above.

54. Submit a financial demonstration, including a financial assurance mechanism for the revised closure and post-closure costs for Phase I which comply with the requirements of A.A.C. R18-9-A203(B) based upon the ADEQ-approved closure and post-closure cost estimates. Until such time, this item will remain a deficiency.

Consequences of Failure to Submit Required Information

The required information listed above must be received by ADEQ on or before August 1, 2016. Failure to submit any of the above required information by the deadline will result in initiation of the denial process for this APP amendment application.

How to Submit

Please submit three (3) copies of the response package for the technical elements. When submitting documents pertaining to the financial demonstration (item nos. 53 and 54), only two (2) copies are necessary. Deliver or mail the response packages to:

Arizona Department of Environmental Quality
Attention: Marcy Mullins, Project Manager, APP Unit
1110 W. Washington Street, Phoenix, AZ 85007

If you have any questions about this letter or would like to schedule a meeting to discuss these items, please contact me at (602) 771-4464.

Sincerely,

Marcy Mullins

Marcy Mullins, Project Manager
APP Unit, Water Permits Section

cc: Luke Peterson, Manager - APP Unit, ADEQ
Wael Hassinan, Reviewing Hydrologist - APP Unit, ADEQ
Vimal Chauhan, Reviewing Engineer - APP Unit, ADEQ
Stephen Twyerould, Ph.D., President & CEO - Excelsior Mining Corporation
Rebecca Sawyer, VP Sustainability - Excelsior Mining Corporation
R. Douglas Bartlett, R.G. - Clear Creek Associates
Alison H. Jones, R.G. - Clear Creek Associates

APP16:409